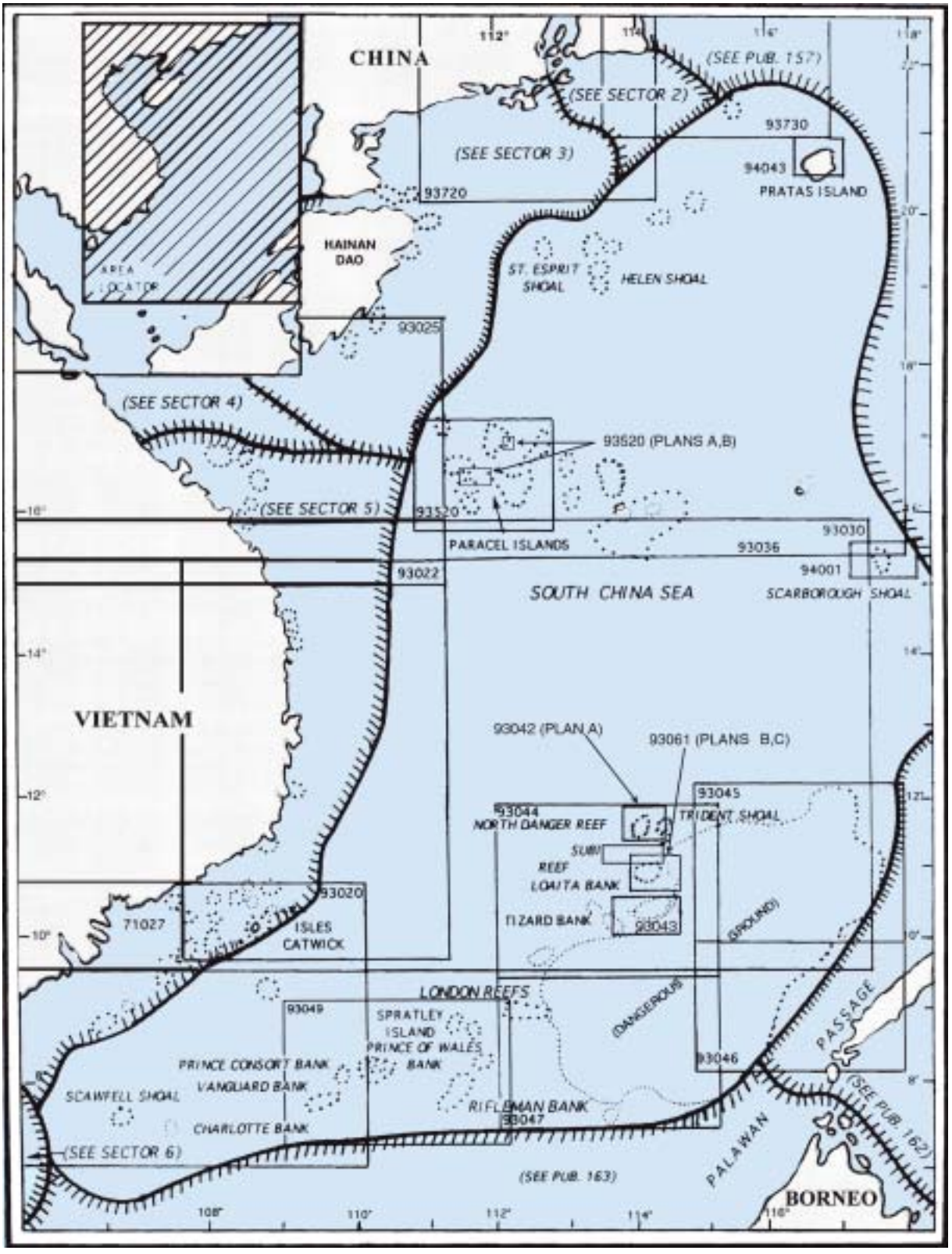
Click on "See Sector" to be hotlinked to that Sector.



Additional chart coverage may be found in CATP2, Catalog of Nautical Charts.

SECTOR 1 — CHART INFORMATION

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SECTOR 1

THE SOUTH CHINA SEA—CENTRAL PART

Plan.—This sector describes the central part of the South China Sea, from Pratas Reef to Scawfell Shoal, about 1,100 miles SW, including the Dangerous Ground.

Vereker Banks and Pratas Reef lie about 130 and 160 miles SE, respectively, of Hong Kong and constitute the northeasternmost dangers in this sector. General remarks on the South China Sea are mentioned first.

General Remarks

1.1 Winds—Weather.—Typhoons occur mostly from July to November, but have developed at other times. Most are found N of 15°N when passing through the South China Sea and follow W to WNW track lines. Typhoons have been known to form in the South China Sea and move on a NW to NE course out of the area.

Typhoons of the western North Pacific Ocean are tropical cyclones and do not differ from the cyclonic storms of other tropical waters. The winds of the typhoon blow counterclockwise and incline toward the center of low-barometric pressure.

The Northeast Monsoon is much stronger and more persistent than the Southwest Monsoon. Over the open sea the Northeast Monsoon is rarely interrupted, while the Southwest Monsoon is often weak and irregular. Winds from the E and SE, which may last for a day or two, are usually the winds that break the storm system.

The change from one monsoon season to another is not abrupt, but takes place in a series of surges extending over a period of 4 to 6 weeks. Transitional months may vary slightly with latitude. The Northeast Monsoon starts earlier and lasts longer in the N latitudes, and the Southwest Monsoon starts earlier and lasts longer in the S part of the area.

Advance warning of an approaching tropical depression or typhoon may be had by observing such items as swell, barometric pressure, cloud cover, and squall activity.

Tides—Currents.—In the open sea, tidal currents are overshadowed by the monsoon drifts. In the vicinity of the land or on banks and shoals, the tidal currents must be considered. Moreover, when near the banks and shoals, there is apt to be a deflection of the monsoon currents as well as a marked increase in velocities.

September is the transition month, commencing the SW set of the Northeast Monsoon currents in the W areas of the China Sea. This current reaches its maximum velocity and constancy in the months of December and January. The time of the onset of the Southwest Monsoon varies, so that in some years the transitional stage may be up to the middle of May.

On the average the NE current of this monsoon attains its greatest velocity and constancy from June to August.

The foregoing remarks are strictly averages for the entire area. Some degree of variation is noted such as between the S and N areas of the South China Sea, as well as between the E and W portions.

Also of profound effect on the current is the proximity of tropical storms that will produce a marked difference from the normal flow.

South China Sea

1.2 The central portion of the South China Sea is entered from the N through the Luzon and Taiwan Straits, from the S through the Singapore Strait, and from the E from the Sulu Sea. This area is bounded on the E by the Philippines, on the S by the island of Borneo, on the W by Vietnam, and on the NW and N by China.

Care should be taken not to violate restricted waters or to approach too closely to the shores of the countries bordering the South China Sea without clearance from the proper authorities. Additionally, jurisdictional disputes at times involve the islands in the open sea area and may cause a conflict should a vessel approach too closely.

The choice of routes and passages in the South China Sea must take into consideration the monsoon season, as well as the size and power of the vessel.

Most dangers in the China Sea are surrounded by deep water, thus rendering soundings useless when approaching them. The approach toward a danger should be made with the sun astern so as to make shoal water or breakers readily distinguishable.

It is considered only probable that all dangers have been located, except in the areas indicated as unsurveyed on the chart, and the positions of many dangers may be as much as 2 or 3 miles in error. Additionally, many reported dangers have not been confirmed, hence their existence and exact location are in doubt. It is prudent to give these types of dangers a wide berth. With the exception of North Danger Reef, Tizard Bank, and the W side of Pratas Reef, the central part of the South China Sea has not been wire dragged.

Accurate fixes are essential before attempting any passages that diverge from the recommended routes. All navigational equipment should be exploited to the fullest extent; however, navigators must depend mainly on lookouts aloft and favorable weather when in the vicinity of reefs or possible dangers. Vessels intending to enter lagoons should be assisted by lead boats equipped to lay temporary buoys.

There are no ports, with the exception of some offshore marine terminals, and only a few protected anchorages within the limits of this sector.

Pipelines lead between structures within a field, between the various fields, and to the shore collecting stations. Gas pipelines contain high pressure flammable natural gas. Navigation is restricted and anchoring or trawling is prohibited in these areas.

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Vessels causing damage to a pipeline by anchoring or trawling risk prosecution, fire hazard, and loss of buoyancy to the vessel.

Floating or fixed drilling rigs may be encountered in some areas covered by this publication. The emitted flares from these structures may be seen from distances exceeding 20 miles.

Buoys and lighted buoys associated with drilling operations are frequently moored in the vicinity of the rigs. The positions of these rigs and buoys are subject to change, and where known, the changes are promulgated by NAVAREA XI Radio Navigational Warning Messages.

Permanent platforms, structures, and buoys are usually charted. These structures exhibit lights (Mo (U) 15 seconds) and sound fog signals (Mo (U) 30 seconds). Numerous below-water obstructions, some marked by buoys, lie in the gasfields.

The limits of the gasfields are charted, but not all of the features are contained within a field. Special care should be exercised when navigating in the vicinity. Anchoring within a gasfield is prohibited, except where designated.

Fishing is a major industry and one of the main sources of food in many countries bordering the South China Sea. There is little evidence of fish migration, but certain grounds have seasonal fishing due to their exposure to the Northeast Monsoon and the Southwest Monsoon. Traps, seine and drift nets, lines, lures, and bottom trawls are used.

Sizes of craft vary from rowing or sailing boats (3m in length), to larger, powered craft. In the coastal waters, the fishing fleet may number from 3 to 50 vessels, with net and line fishing out to the 10m curve, and trawling in deeper waters.

Enormous fleets of fishing junks are met off the coast of China. As a rule, the junks have their smallest sail forward. Large trading junks have five masts, with two small sails aft.

Chinese junks do not carry the regulation lights.

Vessels fishing for squid may be encountered in the vicinity of the Taiwan Strait, principally from July to October. Bright lights may be shown at night to attract the fish.

Fish havens and Fish Aggregating Devices (FADS) are generally established within 5 miles of the shoreline and are markedly frequented by fishing vessels. Fish traps have been reported well offshore despite their generally being set in fairly shallow waters. Marine farms may be moored up to 30 miles offshore and may be attended by service vessels. As their placement may be temporary, they are not necessarily charted.

Pratas Reef

1.3 Pratas Reef, with **Pratas Island** (20˚42'N., 116˚43'E.) on its W central edge, lies 160 miles SE of Hong Kong and constitutes a danger to vessels enroute between Manila and Hong Kong or transiting the Taiwan and Singapore Straits.

Aspect.—This reef is a classic example of a coral atoll, being roughly ring-shaped and about 13 miles in diameter. The lagoon within the reef is coral-studded with depths of up to about 16m. The N, S, and E sides uncover and are steep-to; the W side has submerged dangers through which a channel leads into the lagoon.

The lagoon entrance channel leads from a position about 3 miles S of the W end of Pratas Island in a NE direction for about 4 miles. The channel is reported to have depths of over 2.7m, but crosses charted areas of lesser depth. Buoys and range beacons mark the fairway. It is bordered on the N by a white sand spit and passes to the SE of the ordnance dumping area within the reef.

Several wrecks lie stranded on Pratas Reef. One of these wrecks lies about 7.5 miles, bearing 050˚, from the E extremity of the island. A light is shown from a position near the SE extremity of Pratas Island and an airfield control tower stands about 0.5 mile WNW of the light. In hazy weather, the island is seldom seen beyond 5 or 6 miles, and the breakers on the reef may not be seen until within 1 mile.

Anchorage.—In fair weather, anchorage in the swept area to the W of the island is available to vessels with prior clearance. The anchorage has various depths and a sandy bottom. A vessel of light draft might anchor on the reef, in the middle of the channel entrance in a depth of 5.5m, or cross the reef and anchor inside the lagoon.

Caution.—During the strength of the monsoons, vessels should pass leeward of the reef because the currents invariably set with the wind. The weather is frequently thick and hazy near the reef and soundings give no warning of close approach to it. A wide berth is recommended.

A 9.2m patch lies 3 miles WSW of the W end of the island.

Currents and rips have been reported to be strong in the sector extending 20 to 50 miles NW through NE and E of Pratas Reef and are sometimes mistaken for breakers.

Circular ammunition dumping areas are located about 5.25 miles SW, 1 mile SW, and 1.75 miles SSE of the SE point of Pratas Island.

Pratas Island is composed of sand, covered with scrubby brush, and attains a height of about 12m to the top of the vegetation. There is a small settlement with a weather station located near the center of the E part of the island.

Landing is possible on the S side of the E extremity of Pratas Island. The shallow inlet at the W end of the island is accessible to small boats only. A reef, which dries, extends off the W side of the island with several detached coral patches being found between this reef and the main reef to the NW.

1.4 **Huizhou Oil Terminal** (21˚21'N., 115˚25'E.) consists of two offshore oil platforms and three tanker mooring buoys established 90 miles SE of Hong Kong. A platform and tanker mooring buoy, which lies about 14 miles NE, are connected by a submarine pipeline.

Xijiang Terminal (21˚18'N., 114˚59'E.), developed 20 miles W of Huizhou Oil Terminal, consists of three offshore tanker mooring buoys connected by a submarine pipeline.

Caution.—Several wellheads, with varying depths best seen on chart, exist in the area around these terminals.

Vereker Banks (21˚00'N., 116˚00'E.) consists of two steep-to coral banks 45 miles NW of Pratas Reef. Heavy tide rips and overfalls have been reported in this area. During the month of February, the set of the current in the vicinity of the banks varies between WSW and WNW. At times it sets to windward although, with calms or light SW winds it sets between SSE and ESE. Normal rates of drift are 0.2 to 1 knot.

North Vereker Bank has a least known depth of 11m (1972), with general depths of 60 to 90m over the remainder of the bank. About 2 to 3 miles of deep water separates North Vereker

Bank from South Vereker Bank, which has a least known depth of 58m.

A wellhead, with a depth of 4.1m, lies 30m off North Vereker Bank and is charted.

A wellhead, in a depth of over 100m, lies 28 miles N of Vereker Banks, in position 21°38'N, 116°03'E. The associated production platform and SPM form Lu Feng Terminal, which is enclosed by a restricted area. Exploration for oil is taking place in this vicinity.

Lan Shui Terminal (Liuhua Field) (20°50'N., 115°41'E.) (World Port Index No. 57775) is a purpose built Floating Production Storage and Off-loading vessel (FPSO).

Caution.—A restricted area extends a radius of 2 miles around Jiazi Offshore Platform in position 21°22'15"N, 116°09'25"E. The platform 3 miles N of it has been removed and the restricted area withdrawn.

1.5 **Saint Esprit Shoal** (19°33'N., 113°03'E.) is an isolated coral shoal, with a least depth of 10.8m, lying 35 miles W of the customary track from Hong Kong. Strong rips have been observed in the vicinity of the shoal. Currents generally set with the wind.

Helen Shoal (19°12'N., 113°52'E.) lies 50 miles SE of Saint Esprit Shoal and 15 miles E of the usual route from Hong Kong. The shoal is steep-to, breaks in bad weather, and is charted with a least depth of 10.2m. A depth of 18.3m has been reported to lie 6 miles SE of the shoal.

Strong rips have been observed in the vicinity of Helen Shoal, but upon further investigation deep water was found.

The current is little affected by the shoal and usually sets with the prevailing monsoon.

Paracel Islands and Reefs

1.6 The Paracel Islands are made up of the Amphitrite Group, the Crescent Group, and several off-lying islands and coral reefs. They lie to the W of the main Hong Kong-Singapore route and are centered in 16°40'N, 112°20'E. The islets are of low elevation, and some are covered with trees or vegetation.

Navigation through the area presents little difficulty in fair weather provided a good lookout is kept, preferably high on the mast. Breakers are often visible on many of the reefs and above-water rocks. The use of radar is encouraged as many wrecks lying stranded on the surrounding reefs are radar conspicuous.

In poor weather, unless seeking anchorage, the Paracels should be avoided. Currents generally correspond to the prevailing monsoon, but with a light wind, continually change direction over the reefs attaining a rate of 2 knots. Anchorages, though available, are mostly open and offer only slight protection when leeward of the islands.

1.7 **North Reef** (17°06'N., 111°30'E.) is the northwesternmost danger in the area. The reef is about 7 miles long on its E-W axis, 2.5 miles wide at its broadest width, and steep-to. Rocks break the surface all around the edge of the reef and at certain times the breakers on the reef can be heard at a considerable distance. A boat passage on the SW side of the reef is marked on its E side.

North Reef is reported to be a good radar target, possibly due to the breakers and wreckage on the reef.

Amphitrite Group (16°53'N., 112°17'E.) is the northeasternmost cluster of islands, reefs, and shoals in the Paracel Islands and consists of two parts separated by a deep channel 3.5 miles wide. The N portion has two main reefs bisected by Zappe Pass. Several small islands stand on these two reefs.

The S portion consists of Woody Island and Rocky Island, which lie upon a common reef.

Zappe Pass is about 0.5 mile wide between the reefs and has a least known depth of 4.6m. It is available only for small craft during favorable conditions. With a fresh breeze, breakers extend across the pass and there is usually a strong current running through it.

West Sand is a low sandy cay lying near the W extremity of the northernmost reef. **Tree Island** (16°59'N., 112°16'E.) lies 4 miles E of West Sand and about 1 mile from the E extremity of the reef. The island is covered with mangrove bushes, surrounded by a white sand beach, and has a palm tree near its center.

Tides—Currents.—Currents of 6 to 7 knots have been reported E of the Amphitrite Group during springs.

North Island (16°58'N., 112°18'E.) lies 2 miles ESE of Tree Island across Zappe Pass. A reef extends nearly 0.5 mile NW from North Island and 4 miles SE. Several small buildings stand on the island.

To the SE of North Island lie Middle Island, South Island, and **South Sand** (16°56'N., 112°20'E.). Anchorage may be taken, in depths of 20 to 29m, SSW of North Island and Middle Island, over a bottom of sand. A depth of 20m lies 3 miles NE of South Sand.

1.8 **Woody Island** (16°50'N., 112°20'E.) lies 9 miles SSE of Tree Island, and in the Amphitrite Group it is the S and largest of the islands. It is about 1 mile in length, covered with trees, and surrounded by a white sand beach. Guano is shipped from the island.

Aspect.—Two mooring buoys lie close N of Woody Island.

In the vicinity of the settlement on the island are a square tower, two temples, a meteorological station, and several large buildings. On the S side of the island stands an observation tower and four whip antennas situated about 0.3 mile N of this tower.

A light is shown from a white round stone tower with black bands. Landing can be effected on the SW side of Woody Island. This island is connected to Rocky Island to the NE by an overhead cable. There are depths of 14.6m 5 miles SSE of Woody Island.

Anchorage.—During S winds, anchorage can be taken in a position about 0.5 mile from the reef fringing the N side of Woody Island, in a depth of 24m, sand. In NE winds there is good anchorage about 0.5 mile off the SW shore of Woody Island, in 33 to 37m, sand.

Rocky Island, 14m high, lies on the same drying reef as does Woody Island. There are a few houses on the S end and a concrete pier on the N end of the island.

Two red mooring buoys, No. I and No. II, lie outside the 20m curve, 0.8 mile NW of Rocky Island. A depth of 14.6m exists in approximate position 16°46'N, 112°21'E.

Iltis Bank (16˚46'N., 112˚13'E.), with depths of 10.6 to 14.8m, lies 7 miles SW of Woody Island. The bank is about 3 miles long, 1.5 miles wide, and is fairly steep-to.

Caution.—Caution is advised when anchoring due to the lack of shelter available and imperfect surveys of the area.

Crescent Group

1.9 The Crescent Group consists of several low sand islets and numerous reefs which form a crescent open to the S. They lie 45 miles SW of the Amphitrite Group.

The principal islands are covered with thick vegetation and have been reported to be visible from 10 miles. The lagoon, partly enclosed within the islands and reefs, is about 20 square miles in extent and provides suitable shelter for most classes of vessels.

Caution.—Navigation at night between the islets of this group is dangerous.

Duncan Islands (16˚27'N., 111˚43'E.) is actually two coral islets joined by a sand spit and surrounded by a coral reef that is steep-to. It lies on the SE horn of the crescent and is separated from Drummond Island to the E by the SE lagoon entrance channel which is deep and about 1.5 miles wide. A rock, with a depth less than 1.8m, lies close SE of the E island.

Drummond Island, covered with mangroves and bushes, is 3m high and lies on the SW tip of a continuous reef that extends NE about 4 miles, then curves NW about 4 miles to Observation Bank.

Observation Bank constitutes the N extremity of the Crescent Group. It is a sand cay on a reef about 2 miles long oriented in a SE-NW direction. A detached reef extends about 3.2 miles WSW from the N end of the main reef. The area of the lagoon within the bight of this detached reef and the reef stretching NE and NW of Drummond Island is foul.

1.10 Pattle Island (16˚32'N., 111˚36'E.), 9m high, is covered with brush and mangroves. A reef surrounding the island extends about 1.7 miles NE. On either side of the reef there is a clear channel. Boats can land at LW in a bight on the S side of the island, taking care to avoid the rocks close to shore.

There is a large three-story building in the center of the island with another large building close E. Atop the W building is a skeleton tower surmounted by a flag staff.

A prominent pylon stands about 0.1 mile WSW of the buildings and a conspicuous shrine lies on the SW extremity of the island. There is a meteorological station and a well from which water is available on Pattle Island.

A rock jetty, 183m long, is usable by small boats and extends from the E side of the island, terminating seaward in a small T-head. A red building is situated at the root of the jetty. Depths alongside the face of the T-head range from 1.5 to 2.7m at HW.

The climate at Pattle Island is precarious after a rainfall, when a noxious gas arises from the guano deposits.

Robert Island lies 2 miles SW of Pattle Island. It is 8m high, fringed by a reef, and covered with vegetation. There is a conspicuous observation tower on the S end of the island. Landing can be effected on its E side and well water can be obtained here.

A bank, with depths of 4m and less, extends about 0.8 mile N from Robert Island and another bank, with depths of 1 to 6m, lies within 0.3 mile of the shore on the SE side.

Caution.—Anchorage is not recommended in the area due to the coral bottom.

1.11 Antelope Reef (16˚27'N., 111˚35'E.), which dries partially, forms the SW horn of the crescent. A sand cay is located on the SE extremity of this reef.

The lagoon entrance, between Duncan Island and Antelope Reef, is about 5 miles wide and deep. There is a 3.7m patch and an 8.5m patch located 3.5 and 2.8 miles W, respectively, of Duncan Island.

Anchorage.—There is a good choice of anchorages within the lagoon to suit any prevailing conditions. Depths range from 7.3 to 12.8m over the coral heads, to 20.1 to 47.6m in the more open portions. There is good shelter during the Northeast Monsoon, but a swell can develop during the strength of the Southwest Monsoon. The tidal current in the SE entrance to the lagoon has been observed to be about 1.5 knots, but within the anchorage the tidal current is inappreciable.

Anchorage can be taken near the reef off the N side of Duncan Island, in 18 to 27m, where there are broad patches of sandy bottom.

Money Island (16˚27'N., 111˚30'E.), 6m high and brush covered, lies at the W end of a reef which is separated from the SW horn of the crescent by a channel about 1.5 miles wide. Several sand cays lie E of Money Island on the same reef. The island is reported to be a good radar target.

Reefs and Islands

1.12 Dido Bank (16˚49'N., 112˚53'E.), with a depth of 23m, is steep-to with depths of 146m and more around it.

Lincoln Island (16˚40'N., 112˚44'E.) is the easternmost island of the Paracel Islands and lies 40 miles W of the main Hong Kong-Singapore route. The island is 5m high and brush-covered, about 1.25 miles long, and fringed by a drying reef.

A tower stands on the NE end of the island; the NE face of the island is bluff. It is reported that water can be found on Lincoln Island and that the island is a good radar target.

Anchorage.—Anchorage can be taken leeward of Lincoln Island about 0.5 mile offshore in 18m, coral.

Caution.—Mariners are advised not to cross the bank which extends 14 miles S, then 5 miles WSW from the SE end of the island as it has not been completely examined. This narrow coral bank is studded with rocks. A wreck, reported to be radar conspicuous, lies stranded on the bank about 1.8 miles SE of the SE extremity of the island.

A 15.1m patch and a 13.2m patch lie about 1 mile S and 1.5 miles W, respectively, of the S end of this coral bank. Further shoaling in this vicinity appears highly probable because of the irregular bottom, with visible coral reefs running E and W.

Another bank, with depths of less than 18m, extends about 1.2 miles NW from the island.

Pyramid Rock (16˚35'N., 112˚39'E.), 5m high and cone-shaped, is located 7.2 miles SW of Lincoln Island. When seen from a distance, this islet could be mistaken for a junk.

A 12m patch and 16.5m patch lie 6.5 miles and 10 miles WSW, respectively, of Pyramid Rock in the area close N of Neptuna Banks. Another patch of 20m lies 2 miles SSW of the above 16.5m depth.

Bremen Bank lies 15 miles N of Bombay Reef; it is 14.5 miles long and ENE-WSW oriented, having a least depth of 11.4m near its SW end. In 1954, the bank was reported to be extending W.

Jehangire Reefs lie about 5 miles ENE of Bremen Bank. There are three detached patches with the least depth being 12.8m on the SW part of the S patch. The depths among the patches are very irregular.

Bombay Reef (16˚02'N., 112˚31'E.), the southeasternmost known danger of the Paracel Islands, is a steep-to reef 10 miles long E and W that surrounds a rock-strewn lagoon. The sea breaks on the reef where there are several rocks awash, four above-water rocks, and the remains of many old wrecks. The stranded wreck on the NE extremity of the reef was reported to be radar conspicuous up to 15 miles. A light is shown from the SW extremity of this reef.

Caution.—Caution is necessary when navigating in the vicinity of Bombay Reef.

There is a 1.2m bore at HW which resembles breakers on a reef between Bombay Reef and Vuladdore Reef.

Vuladdore Reef lies about 35 miles NW of Bombay Reef. It is 7 miles long, a little over 2 miles wide, and has a few rocks above-water. At times, the sea breaks heavily over this reef.

1.13 Discovery Reef (16˚14'N., 111˚40'E.) takes the form of a large atoll lying about 20 miles WSW of Vuladdore Reef. The reef is steep-to and marked by heavy overfalls. Several above-water rocks lie on the reef which has barely 3.7m of water over any part of it. Boats can enter the lagoon through channels on the N and S sides of Discovery Reef, the narrower channel being the one on the N side. A stranded wreck lies on the S side of the reef.

Passu Keah (16˚03'N., 111˚46'E.) is a sand cay located on the W end of a steep-to reef which is 5 miles long in an E-W direction. It is located about 8 miles S of Discovery Reef.

Triton Island (15˚47'N., 111˚12'E.) is the southwesternmost danger in the Paracel Islands. It is a sand cay about 3m high and less than 1 mile in diameter. The surrounding reef is steep-to, with at most 1.8m of water over it; it extends about 1 mile N and NE and about 0.5 mile in other directions. The island is a breeding place for birds. In 1986, a square white building was reported to be conspicuous near the center of the island.

Caution.—Triton Island is extremely difficult to distinguish when approaching the Paracels from the SW. A wide berth to the W is recommended. It has been reported that Triton Island has not shown on radar when vessels have been as close as 1 mile.

Macclesfield Bank

1.14 Macclesfield Bank (15˚45'N., 114˚20'E.) is a submerged atoll about 75 miles long on its NE-SW axis and about half that wide at its broadest part. Its W edge lies about 35 miles SE of the main Hong Kong-Singapore route.

Caution.—Caution should be exercised in the vicinity of Macclesfield Bank. Although the bank can usually be seen from aloft due to the fact that in heavy weather the sea along its edge is high and confused, the W part of the reef and lagoon have been only partially examined. Shoals other than those charted may exist. It is recommended that vessels pass either well W or E of the bank.

The coral rim of Macclesfield Bank, with an average width of 3 miles, has depths of 11.8m at Pygmy Shoal on the NE end of the bank and depths of 11.6 to 18m elsewhere. Many other shoals lie around the rim with their depths best seen on the chart. Within the lagoon, Walker Shoal is the shallowest known danger, with a depth of 9.2m.

1.15 Truro Shoal (16˚20'N., 116˚43'E.), with a depth of 18.2m, lies 110 miles E of Pygmy Shoal. In 1983, the position of the shoal was reported to be doubtful.

Scarborough Reef (Scarborough Shoal) (15˚08'N., 117˚45'E.) consists of a narrow belt of barely submerged reef enclosing a lagoon. On the belt are scattered rocks which are visible at a considerable distance. A score or more of these rocks, standing 1.5 to 2.5m high, are found on the SW corner of the reef with South Rock, the highest of these scattered rocks, on its SE extremity. In 1986, the reef was reported to lie 2 miles N of its charted position. Scarborough Reef Light is shown from the NE side of the reef.

Close N of South Rock is a channel about 0.2 mile wide with general depths of 7.3 to 9.2m leading into the lagoon.

This channel is encumbered with reef patches as shallow as 2.7m; the lagoon is almost completely filled with subsurface coral heads at about 15m intervals.

A stranded wreck (radar conspicuous) lies on the SE side of the reef at 15˚05'30"N, 117˚50'00" (PA). The wreck is used as a bombing target. Fishing vessels frequent the reef.

The ruins of an iron tower stand close to the above channel opening. A line of breakers marking the reef has been seen at a distance of 10 miles. Currents in the vicinity of the reef vary with the monsoons, setting NE during the Southwest Monsoon, and in a W or NW direction during the Northeast Monsoon.

Dangerous Ground

1.16 In the SE part of the South China Sea lies an oblong area about 52,000 square miles in extent, known as Dangerous Ground. Dangerous Ground is a large area to the NW of the Palawan Passage which is known to abound with dangers. No systematic surveys have been carried out in the area, and the existence of uncharted patches of coral and shoals is likely.

Sovereignty over some of the islands in Dangerous Ground is subject to competing claims which may be supported by a force of arms. Vessels are warned not to pass through this area.

The area is studded with sunken reefs and coral atolls awash. The major axis of the area bears about 045˚-225˚ for a distance of 340 miles with a maximum breadth along its minor axis of 175 miles. For the approximate limits of Dangerous Ground, the appropriate charts should be consulted.

Squalls frequently arise temporarily reducing visibility to zero. The sea is usually a greenish-blue color with a transparency to depths of 24 to 42m, and on clear days with the sun behind the observer at an altitude of more than 30˚, it is possible to make out the bottom clearly at a depth of 29m.

Sunken reefs may not show discoloration when the sun is low, the sea is mirror like, or the sky is overcast. Close to shoal water, discoloration may not be apparent, but the flow of currents against the wind may cause a belt of rips.

Occasionally the presence of an atoll may be detected by reflection of the discolored water on the underside of clouds directly above it. At low tide, drying patches and rocks are more easily located. With a gentle or moderate breeze, breakers become visible, marking reefs awash.

Winds—Weather.—During the Northeast Monsoon, there are very few squalls and these are of short duration. The weather is comparatively dry and fair with prevailing winds from the NE. Little or no swell was observed during the Northeast Monsoon. When circumstances require, this is the best season for navigating in the region of Dangerous Ground.

The onslaught of the Southwest Monsoon brings increasing cloud cover and squall activity. The wind velocity ranges from a dead calm to a strong breeze, becoming variable in direction.

As the Southwest Monsoon gathers strength, the sea becomes rough and the sky overcast. A fresh SW breeze, accompanied by a moderate to rough SW sea and heavy rains, prevails during the middle months of this monsoon. A moderate SW swell may arise that is usually greater in the W than in the E of Dangerous Ground.

There are many days during the Southwest Monsoon when it is impossible to obtain celestial observations. Considerable atmospheric disturbance to long wave radio broadcasts may be experienced. The high humidity may cause some damage to radio apparatus.

Tides—Currents.—Accurate information on ocean currents is not available in the region of Dangerous Ground.

Caution.—Throughout the area of Dangerous Ground, vessels must rely heavily on seaman's eye navigation and should not normally enter the area other than in daylight.

Radar is of little value. The reefs rise abruptly from ocean depths, hence, soundings give no warning. An uncharted sounding of less than 1,100m should at once call for extreme caution. Difficulty may be experienced with celestial observations because of false horizons. In April or May, during fair weather, mirages are frequently encountered.

Vessels are cautioned not to enter the area other than in an emergency. Little advantage can be had in deviating from the recommended routes in the South China Sea to cross this area in view of the extensive dangers to be encountered. Due to the conflicting dates and accuracy of the various partial surveys of Dangerous Ground, certain shoals and reefs may appear on one chart, but not on another regardless of the scales involved.

Charted depths and their locations may present considerable error in the lesser known regions of this area. Avoidance of Dangerous Ground is the mariner's only assurance of safety.

1.17 North Danger Reef (11˚25'N., 114˚21'E.) is a steep-to coral formation lying to the NW of Dangerous Ground. It is about 8.5 miles long and encloses, but does not shelter, a lagoon. This lagoon is remarkably flat in the inner portions where it has been wire dragged to a depth of 18m, with the exception of an isolated coral head, wire-dragged to a depth of 14.6m, in about the center of the lagoon. The surrounding reef is shallow and variable in width. There are many dangers with depths of less than 9.2m. All known dangers are plainly visible in suitable conditions of light.

North Reef, at the NE end of North Danger Reef, dries in patches. The sea breaks heavily on its weather side during the Northeast Monsoon. North Pass separates North Reef from North East Cay, but is recommended only for small craft entering the lagoon.

North East Cay (11˚27'N., 114˚21'E.) is about 0.4 mile long in a NE-SW direction and fringed by a drying reef extending 0.5 mile NE. It is 3m high, 91m across at its widest point, and covered with shrubs. A light is shown close NE of North East Cay. Shira Islet, a conspicuous hummock, lies about 0.2 mile SE of the observation spot on the SE end of North East Cay.

Middle Pass separates North East Cay from South West Cay. The pass is about 0.75 mile wide and has been wire dragged to a depth of 6.4m in its middle part.

Tidal currents, having a rate of about 1.8 knots, have been experienced in this pass.

South West Cay, located toward the SE part of a drying reef, is thickly wooded. A mast stands near the center of the cay and a gray metal tripod supports a radar reflector on the NE end of South West Cay. Landings have been effected on the SE side of the cay and are possible during the Southwest Monsoon. There are a few buildings on the cay. The cay is marked by a light.

West Pass is divided into two parts. The N part lies between Jenkins Patches and South West Cay and is wire dragged to 10m through its center to the lagoon. Jenkins Patches have a least known depth of 3.7m and occasionally break. The S part of West Pass separates Jenkins Patches from South Reef. This pass is dragged to 8.4m and is about 0.5 mile wide.

1.18 South Reef (11˚23.3'N., 114˚17.9'E.), at the SW end of North Danger, dries in patches. A rock, that dries 1m, stands on the SE side of the reef. The sea breaks heavily on the weather side of this reef during the Southwest Monsoon. Both this reef and North Reef appear greenish-white and can be easily distinguished in fine weather.

The remainder of the encircling reef, to the E then N of South Reef to North Reef, contains two more passes and several named shoals.

South Pass, dragged to 8.5m, is about 0.5 mile wide and is separated from East Pass by Sabine and Farquharson Patches. East Pass, about 1.2 miles wide, has clear depths of 7.7 to 9.3m. Day Shoal, which always breaks in rough weather, and Iroquois Ridge lie N and NW, respectively, of East Pass.

Tides—Currents.—The tides are almost entirely diurnal, with a large diurnal inequality.

The currents near and within North Danger Reef seldom exceed 1.5 knots. The currents appear to be mainly seasonal, depending on the prevailing monsoon and there is very little relation between the tides and the currents. Near the reef, currents having rates of a little over 1 knot may be experienced, with the direction depending on the prevailing wind.

Anchorage.—Ships have anchored about 0.5 mile S of North East Cay during the Northeast Monsoon and 1.25 miles SSE of South West Cay after proceeding through West Pass. Throughout the lagoon there is good holding ground, coral sand. There is little shelter, however, as the depths over the sunken rim of the atoll are too great to restrict the seas.

Trident Shoal (11˚28'N., 114˚40'E.) is a submerged coral atoll lying 16 miles E of North Danger Reef. A reef, awash, lies at the N end of the shoal. Depths of 3.9m and 7.3m lie E and W, respectively, of this drying reef. No entrance to the lagoon can be recommended due to the lack of complete information concerning the atoll.

Lys Shoal, with a least depth of 4.9m, is steep-to and lies to the SSW of Trident Shoal.

Thitu Island and Reefs consist of several dangerous patches upon two coral banks extending 12 miles in an E-W direction and separated by a deep, narrow channel.

1.19 Thitu Island (11˚03'N., 114˚17'E.) lies near the SW part of a drying reef on the E end of the W of the two coral banks. It is 4m high and overgrown with grass and scrub brush.

A light is shown from the SW end of the island near a palm grove and a well is found near the beach through the palms. Occasionally, fishermen inhabit the island as it is possible to effect a landing during the Northeast Monsoon in the middle of the W side where there is an opening in the fringing reef.

Anchorage can be taken outside the reef, about 1 mile SW of the island, in a depth of 18m, from which position the reef is visible.

The W reefs of Thitu Island are composed of several drying reefs and shoal patches. A sand cay lies on one of these drying reefs about 3.5 miles W of the island. Entrance to the lagoon can be taken through the passage to the E of the sand cay, with a least depth of 9m in the center of the channel. Many of the surrounding reefs are marked by breakers.

The E reef, its W edge lying about 0.7 mile E of Thitu Island, is a mass of drying coral and shoal water. This reef extends about 4.5 miles in a NE direction.

Subi Reef (10˚54'N., 114˚06'E.) is located 14 miles SW of Thitu Island. It dries, surrounds a lagoon, is steep-to, and usually breaks. There is no apparent entrance into the lagoon.

Loaita Bank, comprised of shoals, reefs, an island, and two sand cays that lie on the perimeter of a lagoon, is about 20 miles in length on its NE-SW axis which extends to the NW of Dangerous Ground.

1.20 Loaita Island (10˚41'N., 114˚25'E.), 2m high, is on a drying reef at the S edge of Loaita Bank. The island is covered with mangrove, bushes, trees, and coconut palms.

Two reefs lie about 5 miles NW of Loaita Island, with a sand cay on the N drying reef, and a stranded wreck marking the reef to the SW. Between these reefs and the island are several shoals, some with least depths of 5.5m.

About 2.3 miles ENE of the island is a reef, which partially dries, and 4.5 miles farther to the ENE, lies Lankiam Cay, a sand cay in the middle of another drying coral patch. Two drying reefs lie 3.2 miles ENE and 4.5 miles NE, respectively, from Lankiam Cay.

Least depths of 7.3m have been found along the NW edge of Loaita Bank, NW of the SW drying reefs of the bank. No known depths of less than 11m are found N of a position about 1 mile N of the easternmost drying reef and for a distance of about 7.5 miles along the E edge of the bank to its N extremity.

Anchorage can be taken on Loaita Bank with Loaita Island bearing 260˚, distant 0.4 miles. The reef is visible from this position.

Tizard Bank, 30 miles S of Loaita Bank, is over 30 miles in length. It consists of a lagoon bordered by shoals of irregular depth, and by reefs which dry. There are islets on two of the reefs and a sand cay on another. Several coral heads with depths of 6.8 to 12.8m lie in the lagoon. Fishermen from Hainan Dao visit the islands annually around December and January, and leave at the commencement of the Southwest Monsoon.

Caution.—There are several passes through the fringing reefs and the lagoon within, each of which contain numerous dangers which require local knowledge.

These entrances should be used only under the most favorable conditions of light, sea, and weather.

Depths of up to 3.7m less than charted can be expected over the coral shoals and that the shapes of the drying reefs have also changed considerably. Mariners should navigate with extreme caution in this vicinity.

1.21 Namyit Island (10˚11'N., 114˚22'E.), on the S side of Tizard Bank, about 12 miles S of Itu Aba, is 18m high and covered with small trees and brush. It lies on a reef which extends a little over 1 mile W and 0.5 mile E.

Gaven Reefs (10˚12'N., 114˚13'E.) is comprised of two reefs which cover at HW and lie 7 miles W and 8.5 miles WNW, respectively, of Namyit Island. They are the SW dangers of Tizard Bank. The N of the two reefs is marked by a white sand dune about 2m high.

Anchorage can be taken in 13 to 18m, between Sand Cay and the drying reef to the W. Vessels having local knowledge can anchor in convenient depths within the various passes of Tizard Bank, having due regard for conditions of wind and sea.

Caution.—An ammunition dumping ground lies about 6.7 miles N of Itu Aba Island.

1.22 Itu Aba Island (10˚23'N., 114˚22'E.), 2m high, lies on the NW corner of Tizard Bank. It is surrounded by a reef that usually breaks and on which a wreck lies stranded. The island is covered with scrub brush and trees whose tops are about 30m high. There are a few buildings, some in ruins, and a tower-like structure on the island. A lookout mast stands near the E end, and a concrete landing jetty, with a depth of 0.6m at its head, near the SW end of Itu Aba Island.

A reef, which uncovers 0.6m, lies 2 miles E of Itu Aba Island. A grass-covered sand cay, 3m high, lies on the reef rim about 4 miles further to the E. There are a few trees between 5 and 10m high on the cay.

Petley Reef, which dries 0.9m, is about 1 mile in extent and lies on the N side of Tizard Bank. Eldad Reef, 7 miles ESE of Petley Reef, is the easternmost drying reef of the group. The reef is 4.5 miles long with the middle section having a depth of about 1.2m, located at the NE end of the reef.

Western Reef (10˚16'N., 113˚37'E.) lies 36 miles W of Gaven Reefs. It contains submerged rocks, with depths of 1.8 to 5.5m, is steep-to and dangerous.

Discovery Great Reef (10˚01'N., 113˚52'E.) is a long, narrow atoll that lies with its N end about 18 miles SE of Western Reef. The reef rim has several drying rocks on it of which one, called Beacon Rock, stands on its S end. There is no apparent entrance into the lagoon. This atoll is reported to be visible at a distance of 9.5 miles from a height of 21m.

Discovery Small Reef (10˚01'N., 114˚01'E.), lying 10 miles E of the S extremity of Discovery Great Reef, is a round, steep-to, coral patch which dries.

Dangerous Ground—East and North of Tizard Bank and Loaita Bank

1.23 Menzies Reef (11˚09'N., 114˚48'E.) lies at the NE end of a ridge of foul ground that is an extension of Loaita Bank. It is awash at LW and the least depth on the reef, which extends 13 miles SW, is 3.7m.

Between the NE end of Loaita Bank and the SW end of the reef extending from Menzies Reef is a narrow passage having a least known depth of 32.9m.

West York Island (11˚05'N., 115˚00'E.) is covered with trees and bushes and has some tall coconut palms on its S end.

The reef fringing the island extends 1.25 miles farther off the N side than elsewhere.

Irving Reef (10˚52'N., 114˚55'E.), located 12 miles SSW of West York Island, dries in patches and encloses a small shallow lagoon. A sand cay lies near the N end of the reef. A narrow channel, with a least depth of 12.8m, separates Irving Reef from a small reef to the WSW.

Southampton Reefs consist of **Livock Reef** (10˚11'N., 115˚17'E.) and Hopps Reef, about 5 miles NE. Livock Reef, the larger of the two, encircles a lagoon and has a few isolated rocks on it which may be visible at HW.

Jackson Atoll (10˚30'N., 115˚45'E.) consists of a nearly circular atoll about 6 miles in diameter enclosing a clear, deep lagoon. Five reefs, each with drying patches, lie on the rim of the atoll. There are four main entrances into the lagoon.

The NE and E entrances are the deepest, each having a width of about 1.2 miles and depths of 16.2 and 16.8m, respectively, between the shoals.

Anchorage, with good holding ground, can be obtained anywhere within the lagoon over a bottom of sand and coral, but it provides no shelter during inclement weather.

1.24 Nanshan Island (10˚44'N., 115˚49'E.), 2m high, is sandy and covered with course grass and a few coconut trees. Fishermen frequent the island. Depths of 12.8 to 21.9m are found S of Nanshan Island, however, there is a possibility of there being less water than this in the vicinity.

Flat Island lies 5 miles N of Nanshan Island. It is a low, sandy islet with a fringing reef extending about 2 miles NE and SE from it.

A large bank, with reported but unconfirmed depths of 46m, extends 8 miles SE from Flat and Nanshan Islands. Vessels engaged in fishing may be sighted on this bank.

Hopkins Reef (10˚49'N., 116˚05'E.) lies 15 miles E of Flat Island and is steep-to, shoal, and breaks heavily. Baker and Iroquois Reefs lie 7 miles SE and 12 miles SSE, respectively, from Hopkins Reef. Both reefs have drying patches.

These three reefs mark the approximate W limit of Amy Douglas Bank. Hirane Shoal, with a depth of less than 1.8m, lies 18 miles NE of Baker Reef. There are many shoals and reefs, with depths of less than 18m, between Hirane Shoal and Baker Reef.

Hardy Reef, which dries and has a narrow strip of sand in the middle, lies 31 miles S of Iroquois Reef.

Caution.—Directions can not be given concerning Dangerous Ground E to Lord Auckland Shoal and N to Sandy Shoal. The area is relatively unexamined, subject to conflicting reports, and considered dangerous to navigation.

1.25 Sandy Shoal (11˚02'N., 117˚38'E.), the position of which is doubtful, lies about 15 miles NNW of Seahorse Shoal.

Seahorse Shoal (10˚50'N., 117˚47'E.) is considered to be part of Palawan Passage, being the N danger on its W side. It is a pear-shaped reef about 8 miles long in a NNE direction and 3 to 4.5 miles wide. It has a least charted depth of 8.2m on the reef and 31m in its lagoon.

Between Seahorse Shoal and Lord Auckland Shoal, 35 miles SW, lies a 16.5m patch at approximately 10˚38'N, 117˚38'E that is sometimes referred to as Fairie Queen; its position is doubtful.

Lord Auckland Shoal (10˚20'N., 117˚19'E.) has a least depth of 14.6m and lies about 15 miles N of Carnatic Shoal; its position is doubtful. Carnatic Shoal has a least depth of 6.4m and lies just within the E edge of Dangerous Ground; its position is also doubtful.

Dangerous Ground—South of 10˚N

1.26 Half Moon Shoal (8˚52'N., 116˚16'E.) lies 26 miles WSW of Royal Captain Shoal and consists of a narrow reef, partially awash, that encloses a lagoon. The lagoon affords good shelter to small craft and has an average depth of about 27m, although it contains several coral heads with depths of as little as 0.3m.

The entrance to the lagoon is on the SE side of the reef, about 0.4 mile SW of the inclined rock, 1m high, lying on the E side of the coral belt. The pass is about 200m wide and 12.8m deep between the main reef to the S, and the sunken rock to the N. During the strength of the Northeast Monsoon, entry may be impossible. There is a tidal rise of about 1.2m over Half Moon Shoal.

Bombay Shoal (9˚26'N., 116˚55'E.), located 47 miles SW of Carnatic Shoal, consists of a steep-to reef which completely encloses a lagoon. Depths of 29 to 33m, sandy bottom, are found in the lagoon. On the reef are several rocks which dry about 0.6m. Madagascar Rock, which dries 0.6m, lies near the NE extremity of the reef. Two stranded wrecks lie on the NE side of Bombay Shoal. There is a tidal range of about 1.2m over the shoal. A NE flood current was observed in the vicinity of Bombay Shoal.

1.27 Royal Captain Shoal (9˚01'N., 116˚40'E.) stands just E of the charted limit of Dangerous Ground, about 27 miles SW of Bombay Shoal. This shoal consists of a narrow, unbroken, steep-to reef which encloses a lagoon. Depths of 27 to 31m, sand and coral, are found in the lagoon which is also encumbered with coral heads.

Although there is no entrance into the lagoon, small boats can cross the reef at HW under favorable weather conditions. Numerous coral heads and a few drying rocks are found on the reef. Observation Rock, which dries 1.2m, lies on the NW extremity of the reef and conspicuous stranded wrecks are found on the SW and NW corners of the reef. A westerly set of 0.8 knot has been experienced in the vicinity of the shoal.

Investigator Northeast Shoal (9˚10'N., 116˚25'E.), located 19 miles NNE of Half Moon Shoal, is a coral atoll with an enclosed lagoon. It dries in places and a few rocks may be visible at the W end even at HW.

The lagoon is probably accessible to boats at HW. Anchorage has been taken off the W end of the shoal in a depth of 46m, about 0.2 mile from the edge of the reef.

Sabina Shoal (9˚43'N., 116˚36'E.) is a coral atoll 12 miles long on its WNW-ESE axis enclosing a lagoon. On the E half are a number of reefs awash and on the W portion depths over the reef are 3.7 to 18.3m. Sabina Shoal provides unprotected anchorage off its steep-to reef. Three rocks awash lie in an arc from N to ENE, 6 to 8 miles off Sabina Shoal.

Caution.—Caution is advised as the shoal has not been closely examined.

1.28 Boxall Reef (9˚36'N., 116˚10'E.), lying 18 miles SW of Sabina Shoal, is an isolated drying reef. It contains neither a lagoon nor any rocks of distinctive character.

Second Thomas Shoal (9˚49'N., 115˚52'E.) lies 35 miles W of Sabina Shoal. It is 11 miles long N-S, and surrounds a lagoon having depths of up to 27m which may be accessible to small boats from the E. Drying patches are found E and W of the reef rim.

1.29 Mischief Reef (9˚55'N., 115˚32'E.) is a circular coral atoll about 4 miles in diameter. The reef, which is awash and has several drying rocks, encloses an extensive lagoon containing an average depth of 26m. The SW part of the lagoon is free of dangers and affords good shelter, but the NE part is encumbered with coral heads with depths of less than 1.8m. Many of these heads are pinnacles, which are difficult to detect even with good lighting conditions.

There are three entrances to the lagoon along the S and SW sides of the atoll, two of which are boat channels.

South Entrance, the westernmost, has a navigable width of 37m and is 300m in length, with depths of over 18.3m. The axis of the deepest water, clearly defined in good light by its deep blue color, lies in a slight curve, approximately parallel to the edge of the reef on the W side commencing in a direction of about 005˚, then curving N and terminating in a direction of about 354˚. The reef on the W side is steep-to and on the E side is slightly shelving. Care is necessary since the tidal currents are strong at times, and set nearly across the entrance. At neap tides, a tidal current of 1.5 knots was observed.

South Entrance is accessible to vessels under 91m in length. Temporary buoys should be laid at the ends and middle of each side to assist conning. Vessels should enter with good headway keeping slightly W of the center of the deepest water.

Caution.—It was reported (1995) that the area within a 60 mile radius of Mischief Reef has been declared prohibited to all vessels.

1.30 First Thomas Shoal (9˚20'N., 115˚57'E.) is 5 miles long in an E-W direction. This reef, on which a few isolated rocks about 1m high have been observed, dries and entirely encloses a shallow lagoon.

Alicia Annie Reef (9˚24'N., 115˚26'E.) lies 26 miles W of First Thomas Shoal with its axis in a N-S direction. The reef, which dries, completely encloses a lagoon, however, there is no entrance to it. At LW, the N and S ends of the atoll are well above-water and the entire edge of the reef dries about 0.3m.

At the N end, a spit which appears to be white sand, dries 1.2m. Several large and a few small rocks mark the SE corner of the reef. The outer edge of the rim of the reef is steep-to and breakers were observed on the NE side with a moderate NE breeze.

Union Atoll (9˚45'N., 114˚25'W.), 70 miles WNW of Alicia Annie Reef, extends in a NE-SW direction and encloses an incompletely examined lagoon about 28 miles long and up to 7.5 miles wide. There are numerous entrances through the reefs and an anchorage lies within. The rim of the atoll contains numerous drying reefs and several small cays.

Johnson Reef (9˚42'N., 114˚17'E.), of brown volcanic rock with white coral around the inner rim, is located at the SW end of Union Atoll. Johnson Reef partly encloses a shallow lagoon entered from the NE. The largest rock on the reef is about 1.2m high. Several other rocks show above the water on the SE part of the reef; the remainder of the reef is reported to be covered.

Discolored water was reported (1992) to lie SW of Johnson Reef in 9˚32.5'N, 114˚02.0'E.

Collins Reef, a small reef with a coral dune at its SE part, lies 1.5 miles NNW of Johnson Reef. It is separated from Johnson Reef by a relatively deep channel with a coral bottom.

Sin Cowe Island (9˚52'N., 114˚19'E.) is a reef-fringed cay, 4m high, lying on the NW side of Union Atoll. There are some buildings on the island and a beacon at its NE end.

Whitsun Reef (9˚58'N., 114˚39'E.) is triangular in outline and lies at the NE end of Union Atoll. Rocks on the reef uncover at LW and the reef is marked by breakers in winds of moderate force.

Grierson Reef, a small cay lying 5 miles SW of Whitsun Reef, is formed by sandy beaches with two black above-water rocks to the S.

The W lagoon is accessible only to small boats and has depths of 5.5 to 14.6m interspersed with coral shoal heads.

Lansdowne Reef, a shoal with a white sand dune, lies 6 miles NE of Johnson Reef.

1.31 Bittern Reef (9˚14'N, 113˚40'E) is reported to be circular in shape and to be of volcanic origin. It does not contain a lagoon and is entirely covered with water. It is considered very dangerous because no breakers show and its sides are very steep-to. Its greatest diameter is estimated at less than 0.5 mile. According to a Japanese survey, the least depth on the shoal is 0.9m and the discoloration of Bittern Reef is visible from the bridge for about 3.5 miles, and from the masthead for about 4.5 miles with a high sun behind the observer.

Allison Reef (Alison Reef) (8˚50'N., 114˚00'E.) is a drying atoll-reef about 11 miles long in a general NW-SE direction forming a lagoon which appears to be shallow and foul. It lies with its W end about 13 miles SE of Pearson Reef. On the N side in a position about 2.5 miles W of the W end there is an entrance 0.35 mile wide with a depth of 9m. The side is strewn with small rocks. At LW, some of these uncover about 0.9m.

The S side consists of a number of isolated drying patches between which there are narrow channels with depths of about 9m. At HW, Allison Reef does not uncover, but it can be

located by the breakers, which can be seen at a distance of 5 or 6 miles on a clear day.

Anchorage is possible off the SE and W ends of Allison Reef, in depths of 60m, or along its S side and off the N entrance to the lagoon, in depths of 9m.

Cornwallis South Reef (8˚45'N., 114˚13'E.), 8 miles ESE of Allison Reef, consists of a drying reef enclosing a lagoon which is open to the S.

The entrance is about 0.2 mile wide and contains several coral patches. Depths of 9m are found within the lagoon, but it has not been closely examined. There are some small drying rocks on the SE side of the reef which breaks in a NE wind.

Cornwallis South Reef remains identifiable at HW.

1.32 Pearson Reef (8˚59'N., 113˚42'E.) is a drying steep-to atoll about 5 miles long in a WSW direction and 1 mile wide. It encloses a lagoon to which there is no apparent entrance.

There is a sand cay on the NE extremity of the reef. On the NW side of the reef is a stranded wreck.

Anchorage can be taken 0.2 mile off the NE end of the reef in a depth of 27m.

Pigeon Reef (Tennent Reef) (8˚52'N., 114˚38'E.) is a triangular-shaped drying atoll completely enclosing a lagoon which appears to be accessible to boats at HW. There is no entrance. The reef is brown in color and appears to be of volcanic origin with a lining of white coral around the inside of the rim.

Commodore Reef (8˚22'N., 115˚14'E.) is an atoll about 7 miles in length, and extends E and W lying about 47 miles SE of Pigeon Reef. It dries 1.5m on its W end, and in patches elsewhere around its circumference. The reef forms two lagoons with a sand cay 0.5m high on the neck between them.

The E lagoon has not been closely examined, but appears to be shallow and full of rocks. The encircling reef is completely covered at HW, except for the sand cay near the middle and a rock 0.3m high at the E end.

Investigator Shoal (8˚10'N., 114˚40'E.) is an irregular atoll formation lying with its E extremity about 25 miles SW of the W end of Commodore Reef. The shoal, which extends in an E-W direction for 18 miles with a width of 8 miles, is surrounded by a coral reef on which there are a few drying sections, but over the larger part of which there are depths of 5.5 to 18.3m.

Large fishing vessels enter the lagoon in fine weather through a channel near the middle of the N side of the reef to anchor in depths probably over 46m, although little or no shelter is provided by the atoll.

The S side of the reef is steep-to with an apparent entrance at its SE end that is 0.2 mile wide and 37m deep, except for two patches with a depth of 11m. The W end of the reef breaks and has a few isolated rocks which may be visible at HW. There are two drying rocks on the S side of the shoal.

Currents, with velocities up to 1 knot, are reported on all sides of Investigator Shoal.

Ardasier Reef (7˚38'N., 113˚56'E.) is the W extremity of Ardasier Bank, which lies 14 miles NNE of Swallow Reef.

This reef, which dries, encloses a shallow lagoon which is probably accessible to boats at HW. The reef is steep-to except on its E side, where it joins Ardasier Bank. Ardasier Bank extends 37 miles ENE from Ardasier Reef.

It is surrounded by a fringe of coral, over which there are depths of 3.7 to 18.3m. The depths in the center of the bank are believed to be from 37 to 55m, though unexamined.

Fish Aggregating Devices may be encountered in the vicinity and SW of Ardasier Bank.

Tides—Currents.—Currents in the area S of Investigator Shoal and Ardasier Reef appear to set to the W.

Currents, with a velocity of up to 1 knot, are reported on all sides of Ardasier Bank. The tides are diurnal with a range of about 1.5m.

Caution.—Vessels are advised to avoid the vicinity of Ardasier Bank and navigate with caution, especially near the middle of the N side where depths of 40 to 49m show no apparent discoloration.

1.33 Erica Reef (Enloa Reef) (8˚07'N., 114˚08'E.), lying WNW of the N end of Ardasier Reef, is an oval drying reef that encloses a shallow lagoon. A few drying rocks lie on the E side of Erica Reef and may show at HW. No entrance or anchorage has been found.

Mariveles Reef (8˚00'N., 113˚56'E.), about 6 miles long in a general NW-SE direction, lies about 7 miles W of Erica Reef. It dries, encloses two lagoons, and has a sand cay 2m high on the neck between the lagoons. A few isolated rocks may be just visible at HW.

Dallas Reef (7˚38'N., 113˚48'E.) is about 5 miles long E-W and dries entirely, enclosing a small lagoon. A line from Dallas Reef to Barque Canada Reef marks a portion of the approximate SW limit of Dangerous Ground.

Barque Canada Reef is a long narrow reef, nearly all of which dries. It extends about 15 miles NE from a rock 4.5m high in 8˚05'N, 113˚14'E.

The lagoon within the reef appears to be fairly deep, but is inaccessible. At the NE end of the reef there is a group of rocks 2m high. This N part is not as steep-to as the S part and temporary anchorage may be taken in favorable weather.

U.S.S. Pigeon Passage

1.34 In 1937, the U.S.S. Pigeon conducted a survey of Dangerous Ground and developed a 10 mile wide channel clear of dangers, except for a shoal patch charted 19 miles SSW of Alicia Annie Reef.

A deep-draft vessel might navigate the passage by day, in comparative safety; under optimum conditions the passage might be negotiated at night.

Directions.—From 8˚40'N, 116˚30'E, the recommended track leads on a course of 291˚ for 208 miles to 9˚55'N, 113˚15'E, then on a course of 327˚ for 71 miles to 10˚55'N, 112˚35'E.

Caution.—Caution should be exercised when using the passage, as the shoal patch mentioned above lies about 3 miles SSW of the track. Due to the nature of the area and the age of the surveys for the passage, less water or dangers in addition to those charted may exist.

Soundings of less than 1,100m are charted near the recommended track SSE and SSW of Alicia Annie Reef. Soundings of less than 1,280m are charted near the recommended track S of Discovery Great Reef.

Dangerous Ground—Southwest Islands and Reefs

1.35 Fiery Cross Reef (North West Investigator Reef) (9˚35'N., 112˚54'E.), about 14 miles long NE-SW, is steep-to and composed of coral patches, several of which dry. The largest drying patch is located at the SW end of the reef and supports a prominent rock, 1m high. With the exception of this rock, the reef covers at HW.

A dangerous wreck lies 4 miles SW of the NW extremity of the reef. Breakers occur on Fiery Cross Reef with even a slight swell and make it visible from a distance of several miles.

Anchorage has been taken about 0.2 mile from the reef, with the prominent rock bearing 062˚, distant 0.7 mile, in a depth of 24m.

London Reefs consists of four reefs on a line between **Cuarteron Reef** (8˚54'N., 112˚52'E.) and **West Reef** (8˚51'N., 112˚11'E.). Caution is necessary when navigating in the vicinity of London Reefs as they are all steep-to, rendering soundings of little value. They should not be approached with the sun ahead, as it becomes difficult to recognize the shoaling water and breakers.

Cuarteron Reef is the easternmost of the London Reefs. Several rocks, 1.2 to 1.5m high, lie on the N side of the reef.

The shallow lagoon within the reef has no entrance.

Currents at Cuarteron Reef are apparently diurnal, their rise being 1.8 to 2.1m. The tidal currents along its N side set W during the flood and E during the ebb.

East Reef (8˚50'N., 112˚35'E.) encloses a lagoon with depths of 7.3 to 14.6m and lies about 16 miles WSW of Cuarteron Reef. Numerous coral heads encumber the lagoon.

A sharp rock, 0.9m high, lies near the W end of the reef; more rocks are visible at the E and S parts of the reef. East Reef is marked by heavy breakers.

1.36 Central Reef (8˚55'N., 112˚21'E.) lies 14 miles NW of East Reef. Although awash, it is not always marked by breakers. At the SE part of the reef there is an entrance to a shallow lagoon and at the E and SW ends of Central Reef lie two small, white sand cays.

West London Reef (Hsi Chiao), the westernmost danger of London Reefs, is marked by a light and has several detached coral patches around its edges. The N side of the reef is marked by breakers making it visible on the approach from the N, but the S side is difficult to make out, especially in calm weather.

There is a sand cay, 0.6m high, on the E side of the reef. A lagoon, with depths of 11 to 14.6m but having many coral heads, is enclosed by West Reef.

Spratly Island (Storm Island) (8˚38'N., 111˚55'E.), grass covered, 2.4m high, flat and less than 0.5 mile in extent, is located about 22 miles SW of West Reef ,on the S end of a coral bank over 1 mile long.

The island has a margin of white sand and broken coral and is surrounded by drying ledges and coral heads. A cairn, 5.5m high, stands near its S point.

The E side of the island is steep-to, having depths greater than 18m when beyond 0.1 mile from shore. Depths of less than 14.6m and 5.5m extend 0.5 mile NE and N, respectively, from the island. To the W and SW, depths of less than 5.5m are found up to 0.2 mile off the island before the bottom falls away steeply.

Tides—Currents.—A tidal rise and fall of 1.6m has been reported at Spratly Island. The tidal current sets SW during the rising tide at the NE of the bank, and from SE to NE during the falling tide.

Anchorage.—Anchorage can be taken after gaining proper clearance on the banks either NE or SW of the island. Anchorage has been taken on the bank in a position about 0.6 mile NE of the island, in 18.3m, sheltered from SW winds.

Ladd Reef, 15 miles W of Spratly Island, is a drying reef 3 miles long and 1 mile wide. The reef encloses a lagoon which, for all practical purposes, has no entrance. The reef is marked by a light.

1.37 Amboyna Cay (Anbo Shozhoa) (7˚52'N., 112˚55'E.) lies near the SW edge of the previously-described Dangerous Ground. This cay is about 2m high with a sand beach, broken by coral, and rubble. Coral ledges which partly dry and on which the sea breaks when there is a swell, extend 0.2 mile offshore in places.

An obelisk, 3m high, stands on the SW part of the cay. The cay is also marked by a light, which has a racon.

Coral banks, on which the sea breaks heavily, extend 0.5 mile NW and 1 mile NE from the island with depths of 7.3m to a distance of over 0.3 mile offshore on the latter bank. A reef, having depths of 3.7 to 4.6m, is reported to lie about 0.8 mile NW of the cay.

The W and SW part of Amboyna Cay is fringed by steep-to reefs to a distance of 0.3 mile. The W and SW reefs gradually shoal from depths of 7.6m at 0.2 mile offshore to 1.5m at 27m offshore. About 0.1 mile S of the island, the fringing reef has a depth of 7m.

Tides—Currents.—Tidal currents, with a maximum rate of 1.5 knots, were observed near Amboyna Cay. The current sets N on the rising tide and W on the falling tide.

Anchorage.—Vessels can obtain sheltered anchorage during the Southwest Monsoon, in a depth of 9m, on the reef extending NE from the cay. Additionally, it is reported that anchorage can be taken farther to the NE in 14.6m, with the center of the cay bearing 224˚, distant 1 mile. To the E, a survey ship anchored in 11.9m about 0.4 mile from the center of the island and to the W, anchorage can be taken in 9.5m with the cay bearing about 109˚, distant 0.3 mile.

Caution.—Caution is required when anchoring as the reefs are extremely steep-to.

Swallow Reef, 60 miles SE of Amboyna Cay and formed of a belt of coral surrounding a shallow lagoon, is 3.8 miles in length, E and W, and 1.2 miles in width. At its E and SE part are some rocks 1.5 to 3m high, the highest of which is in 7˚23'N, 113˚49'E. Breakers usually mark the reef; a wreck lies stranded (1959) on its W end. By day, Swallow Reef has been sighted at 8 miles. Swallow Reef is reported (1986) to have extended in area.

1.38 Royal Charlotte Reef (6˚57'N., 113˚35'E.) lies 29 miles SSW of Swallow Reef and is nearly rectangular in shape and about 1 mile long. Several boulders, 0.6 to 1.2m high, lie near its SE side and some rocks, awash, lie on its NE side. An area of foul ground surrounds Royal Charlotte Reef and

extends as much as 8 miles from the edge of the reef. Breakers have been reported over this reef.

1.39 Anoa Natuna Marine Terminal (5˚13.2'N., 105˚36.4'E.) is a Floating Production, Storage, and Offloading vessel (FPSO).

The converted tanker "Anoa Natuna" is permanently moored to a Single Point Mooring (SPM) buoy. A wellhead platform feeds the FPSO through a pipeline and stands 1 mile NW of it. The platform can be identified by its gas flare from a considerable distance, and the FPSO displays a white flashing Morse (U) light at the bow and the stern, as well as a red flashing Morse (U) light at the bow and the masthead.

Pilotage.—Pilotage is compulsory and the berthing master boards vessels at the anchorage. Vessels berth at the terminal during daylight only.

Regulations.—Indonesian Government regulations are strictly enforced. The Indonesian flag should be flown by day throughout the vessel's stay at the terminal. Port facilities are not available. However, emergency medical services can be arranged.

Anchorage.—Anchorage is recommended within a radius of 0.75 mile from 5˚12'N, 105˚38'E.

Caution.—A rectangular restricted area of 3 miles by 2 miles has been established surrounding the terminal. Vessels are not allowed to enter a prohibited area within the restricted area around the terminal without the berthing master onboard.

Anchoring within the restricted area is prohibited. There are no facilities for bunkers, fresh water, provisions, or reception of dirty ballast.

Rifleman Bank lies 70 miles W of Amboyna Cay with its N end, Bombay Castle, lying at 7˚56'N, 111˚42'E. The bank extends 28 miles S from Bombay Castle and has a maximum breadth of 15 miles, with many shallow patches of sand and coral around its edges. A light, situated S of Bombay Castle, marks the E side of the bank.

Bombay Castle has a depth of 3m and breaks in all but the finest weather. Johnson Patch., with a depth of 7.3m, lies on the W side of Rifleman Bank; Kingston Shoal, with a depth of 11m, lies at the S end; and Orleana Shoal, with a depth of 8.2m, lies on the E end. The remaining areas between and within these shoals have depths of 7 to 82m, however, the existence of undiscovered dangerous shoals in this area should not be discounted.

1.40 Prince of Wales Bank (8˚09'N., 110˚30'E.) has a least depth of 7.3m found on its W side. The bank is of coral and its depths are very irregular. The bank is marked by a light on its NE side.

Alexandra Bank, marked by a light and lying about 2 miles SE of Prince of Wales Bank, has a least depth of 5.5m over coral bottom that is distinctly visible.

Grainger Bank, with depths of 11 to 14.6m, lies about 16 miles SW of Alexandra Bank. The coral bottom of the bank is visible over nearly all the bank. The bank is marked by a light.

Prince Consort Bank (7˚55'N., 109˚58'E.), 30 miles WNW of Grainger Bank, has a least depth of 18m near its NW edge.

The bottom is of sand and coral. Depths of 22 to 24m are found on the W edge of the bank, which is marked by a light.

Vanguard Bank lies 30 miles SSW of Prince Consort Bank and 60 miles SE of the main Hong Kong-Singapore route.

The least depths found are two 16m patches near the N end of the bank. Lights mark the N side of the bank.

An 18m shoal lies 10 miles SSE of the center of Vanguard Bank. Another shoal, with a depth of 13m, lies 25 miles W of the SW end of the same bank and a shoal with a depth of 7.5m lies 10 miles SSW of the 13m patch.

It was reported (1990) that a depth of 12.3m lies close W of the 13m depth.

Charlotte Bank (7˚08'N., 107˚36'E.) is the S danger on the W side of the main Hong Kong-Singapore route. The bank is about 4 miles in extent, with a least depth between 8.5 and 11m.

A depth of 33m lies 80 miles S of Charlotte Bank in position 5˚47'N, 107˚30'E.

Scawfell Shoal (7˚18'N., 106˚52'E.), lying about 45 miles WNW of Charlotte Bank, has a least depth of 9.1m, coral, near its center.

A reef, 0.5 mile in diameter, lies in position 7˚35'30"N, 106˚24'00"E. Three dangerous wrecks, with depths of 29m, 20m, and 23m, lie SSW of and up to a distance of 60 miles from the reef.

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